A COMPREHENSIVE INTENSITY STUDY OF THE ν_4 TORSIONAL BAND OF ETHANE

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The torsional spectrum of C_2H_6 has been investigated from 220 to 330 cm^{-1} to measure the intensity of the fundamental and the first torsional hot band needed for atmospheric studies of Titan. Several spectra were measured at resolutions of 0.01 and 0.02 cm^{-1} using the JPL Bruker IFS-125 coupled to a coolable multi-pass absorption cell originally developed at University of British Columbia.[a] Spectra were recorded at several temperatures from 293 K to 166 K, with the lower temperatures relevant to the stratosphere of Titan. Because this spectrum is very weak, a long absorption path of 52 m was used along with substantial sample pressures from 35 to 255 Torr. Intensities were analysed using a quantum mechanical model reported previously.[b] The torsional fundamental of C_2H_6 is observed in the CIRS spectra of Titan. Line parameters for the torsional bands are required for accurate characterization of spectral features of Titan's far-infrared region. The current study should lead to a better understanding of the methane cycle in planetary atmospheres and permit the identification of the other molecular features in the CIRS data.[c]

[a] E. H. Wishnow, A. Leung, and H. P. Gush, Rev. Sci. Instr., 70, 23 (1999).

[b] N. Moazzen-Ahmadi, A.R.W. McKellar, J.W.C. Johns, and I.Ozier, J. Chem. Phys. 97, 3981 (1992).

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